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Strong et al.

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(54) **SATELLITE SIGNAL DISTRIBUTION**

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None

See application file for complete search history.

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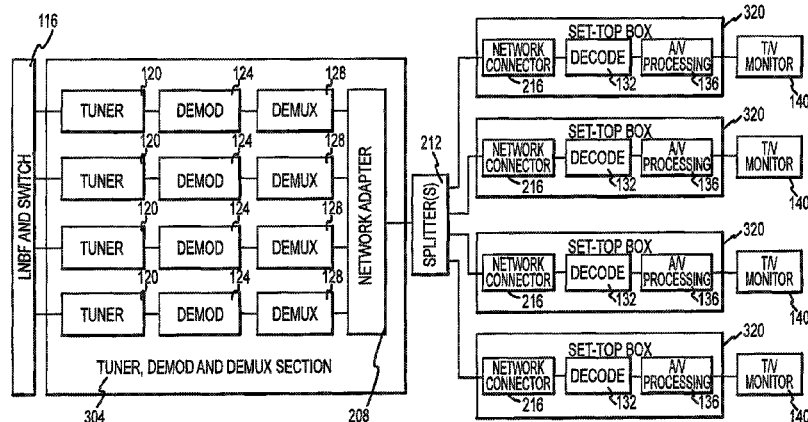
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ABSTRACT

Disclosed is a system and method for receiving satellite tele-
vision signals. A centralized system component may be pro-
vided in association with the satellite antenna. The central-
ized system component includes at least one or more tuners
and one or more demodulators. The centralized component
may provide output through a network adaptor that provides
output through a single output, which is a coaxial cable in one
embodiment. The centralized component may send output in
the form of packetized data directed to one or more set-top
boxes by way of a network transaction. The set-top box or
boxes may be operable to receive the network transaction and
to process the data, as appropriate, for display on a TV/moni-
tor.

16 Claims, 7 Drawing Sheets



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H04N 21/438 (2011.01)
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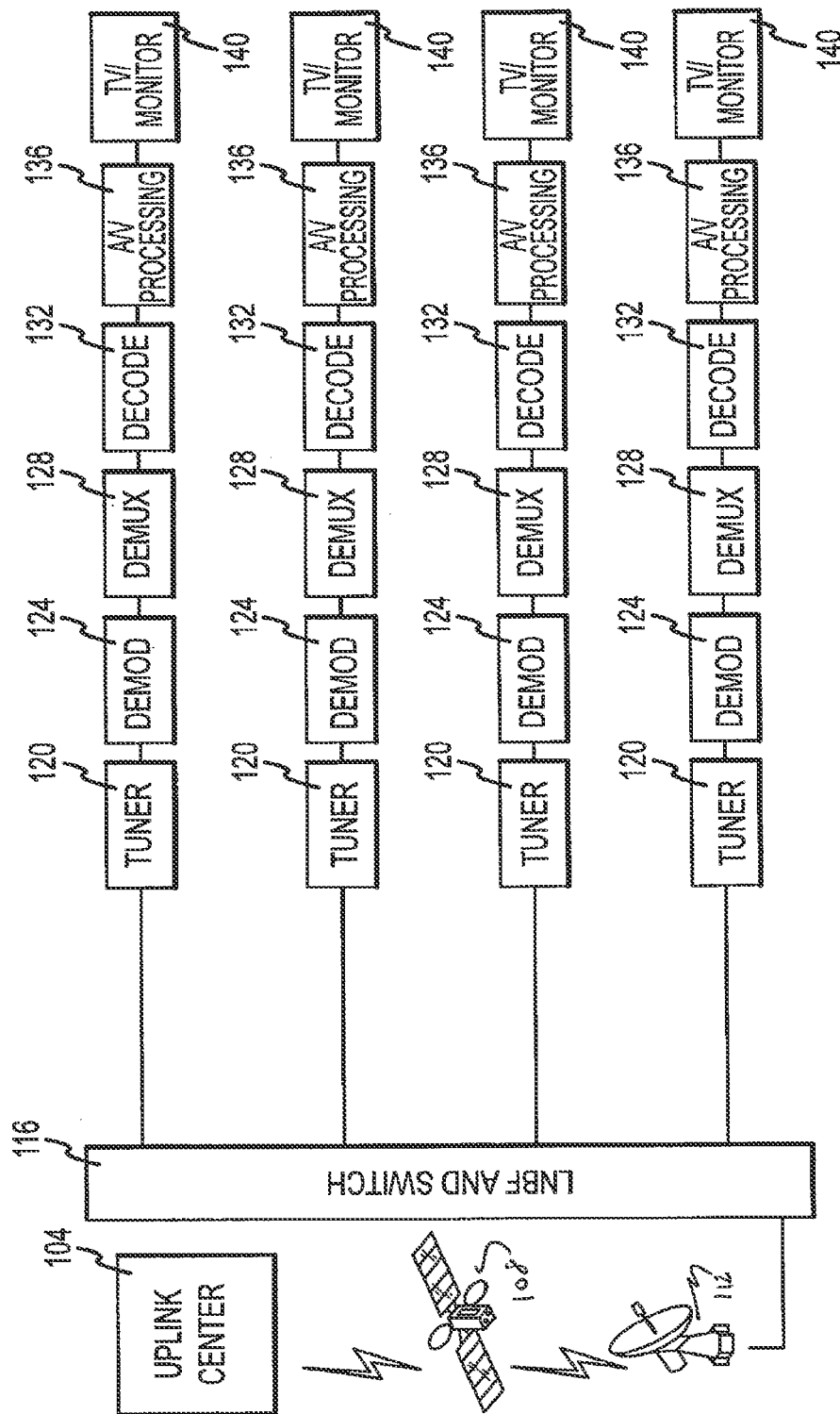


FIG.1

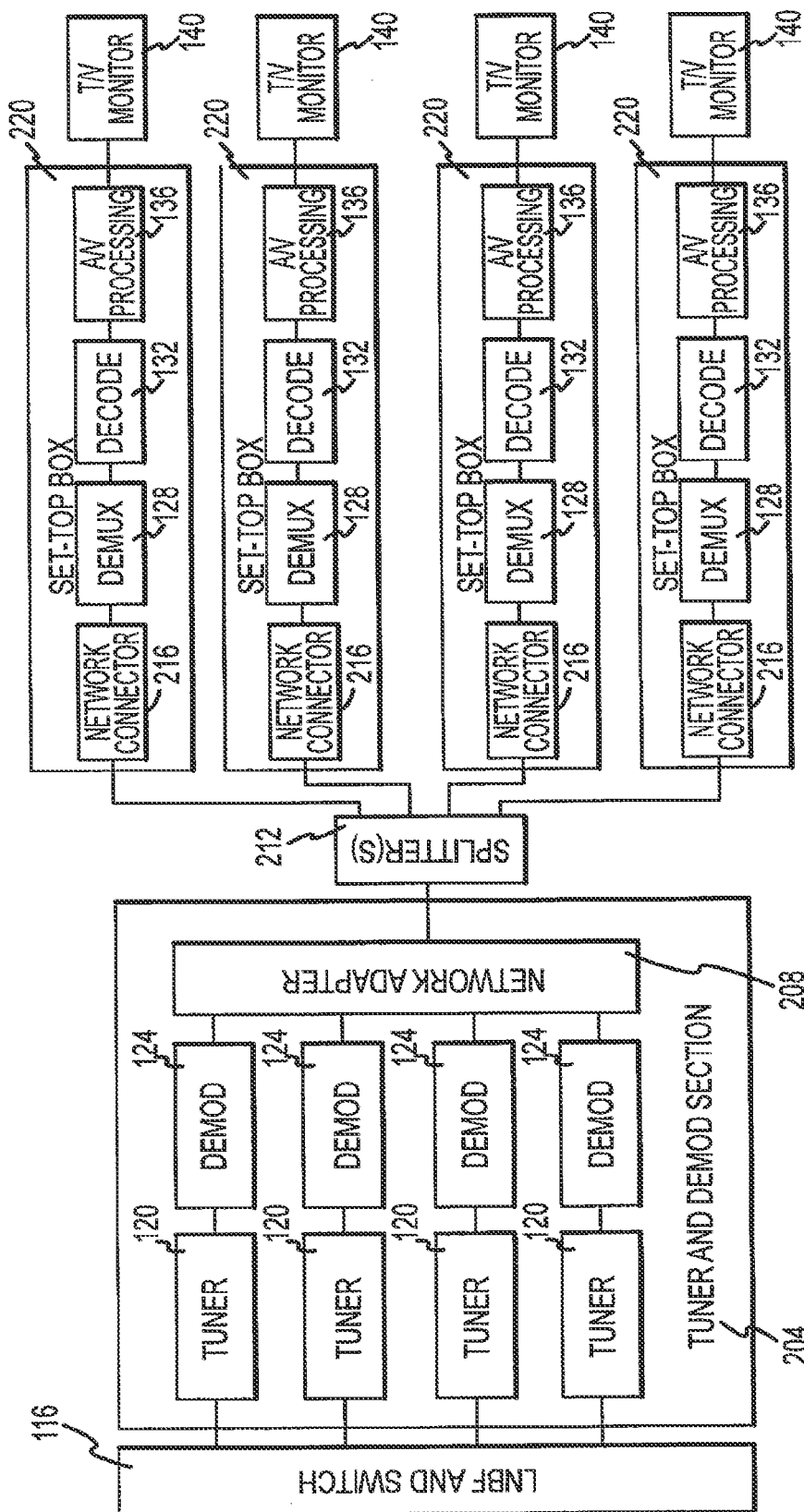


FIG. 2

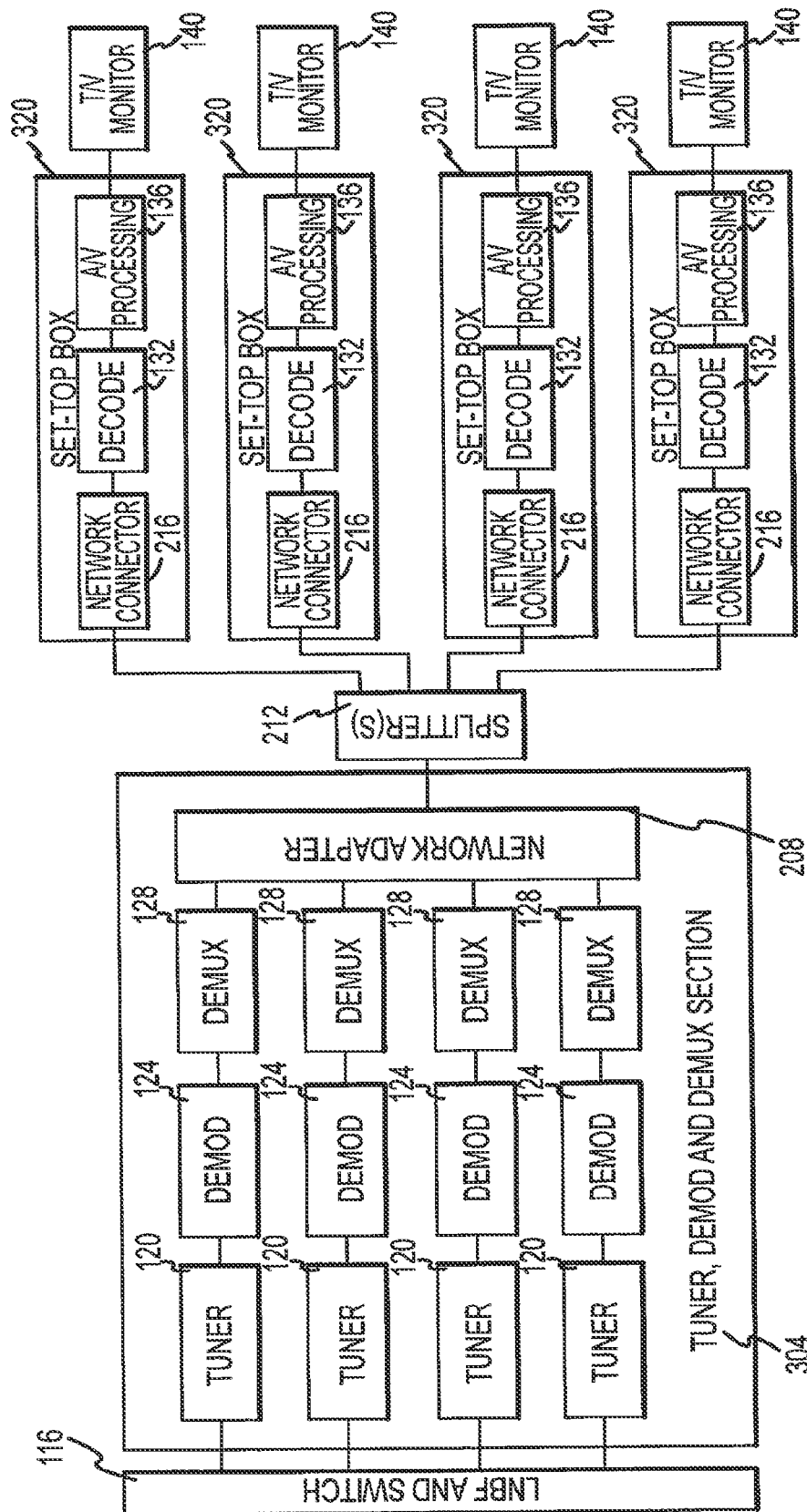
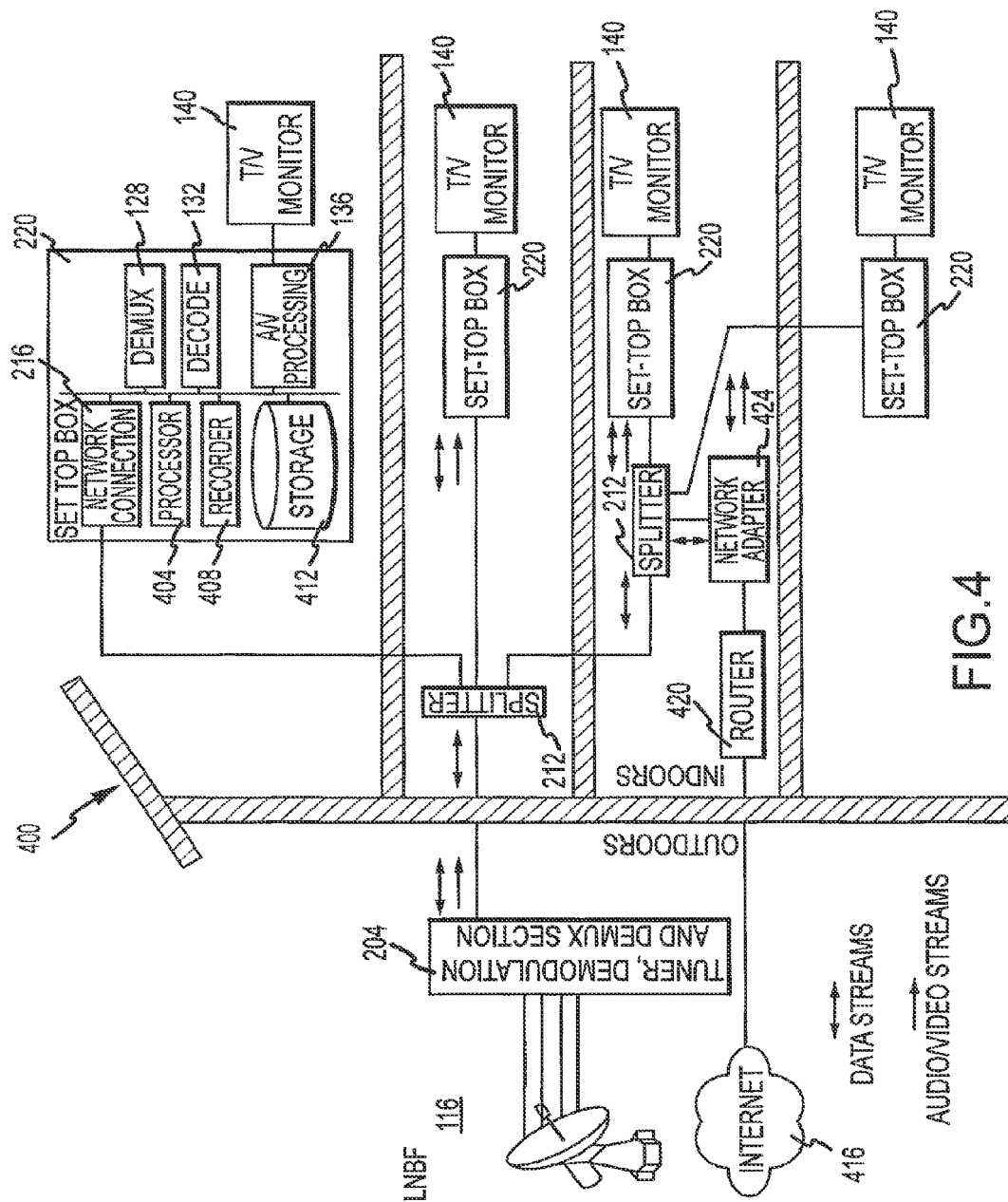


FIG.3



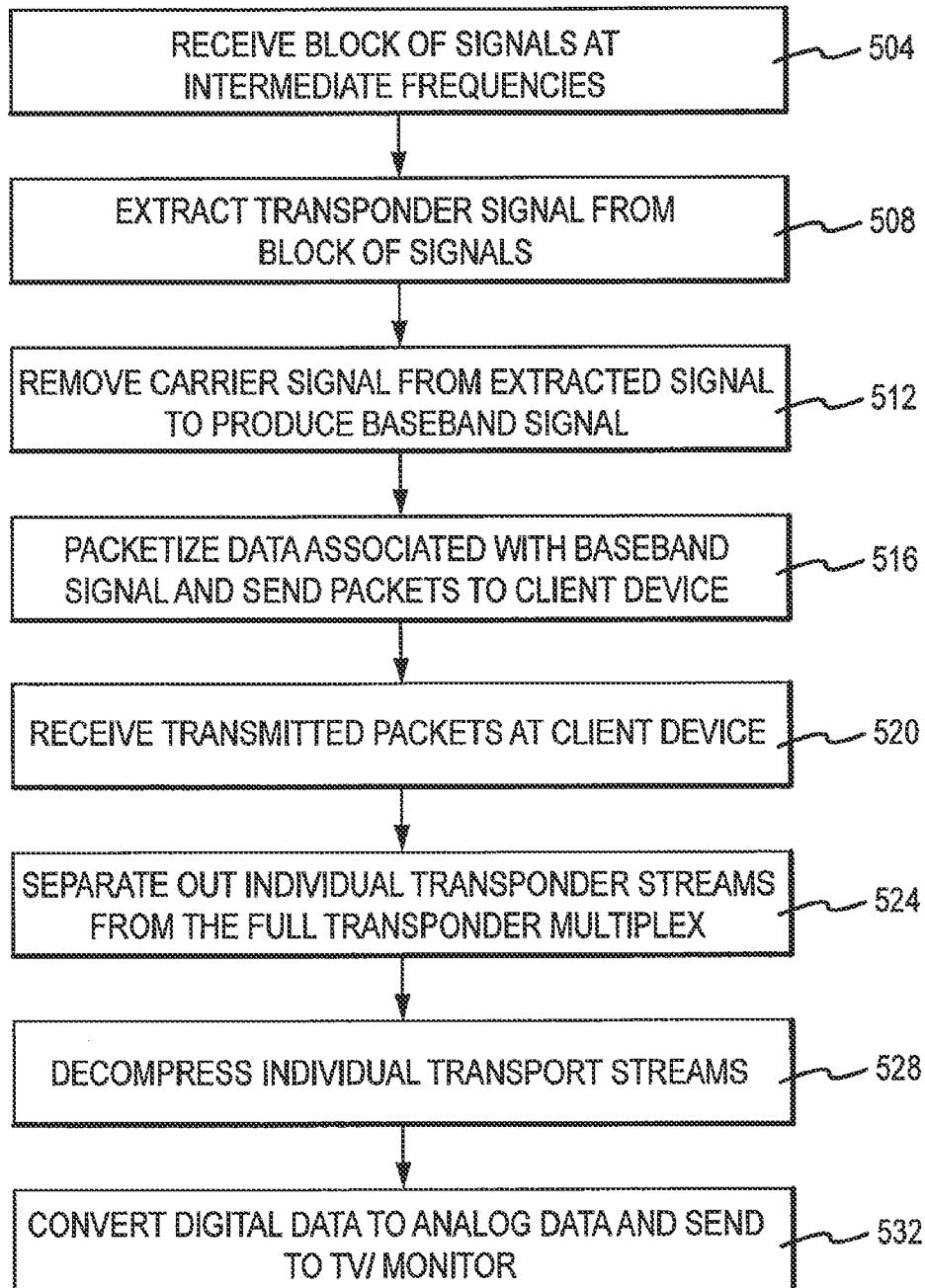


FIG.5

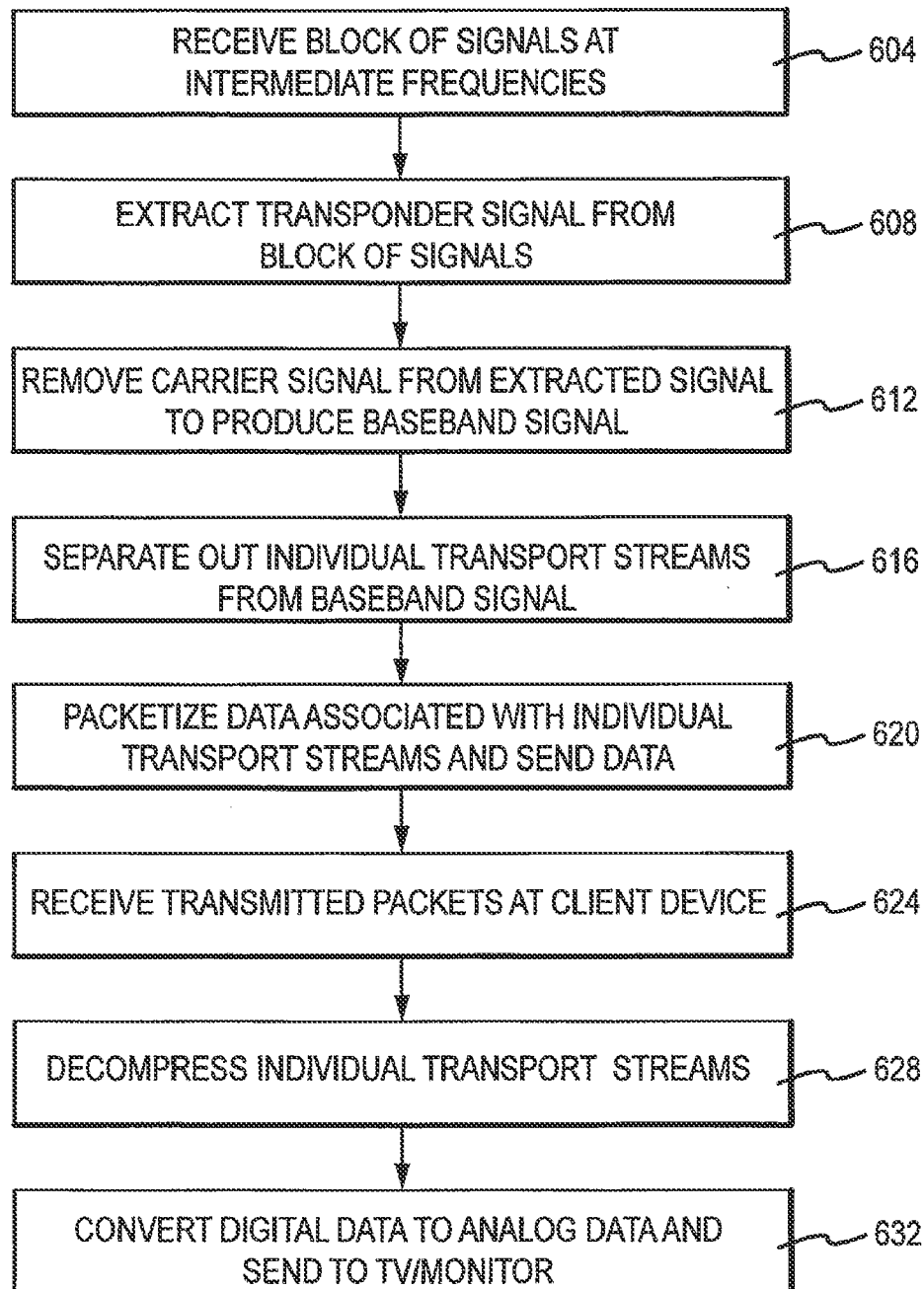


FIG. 6

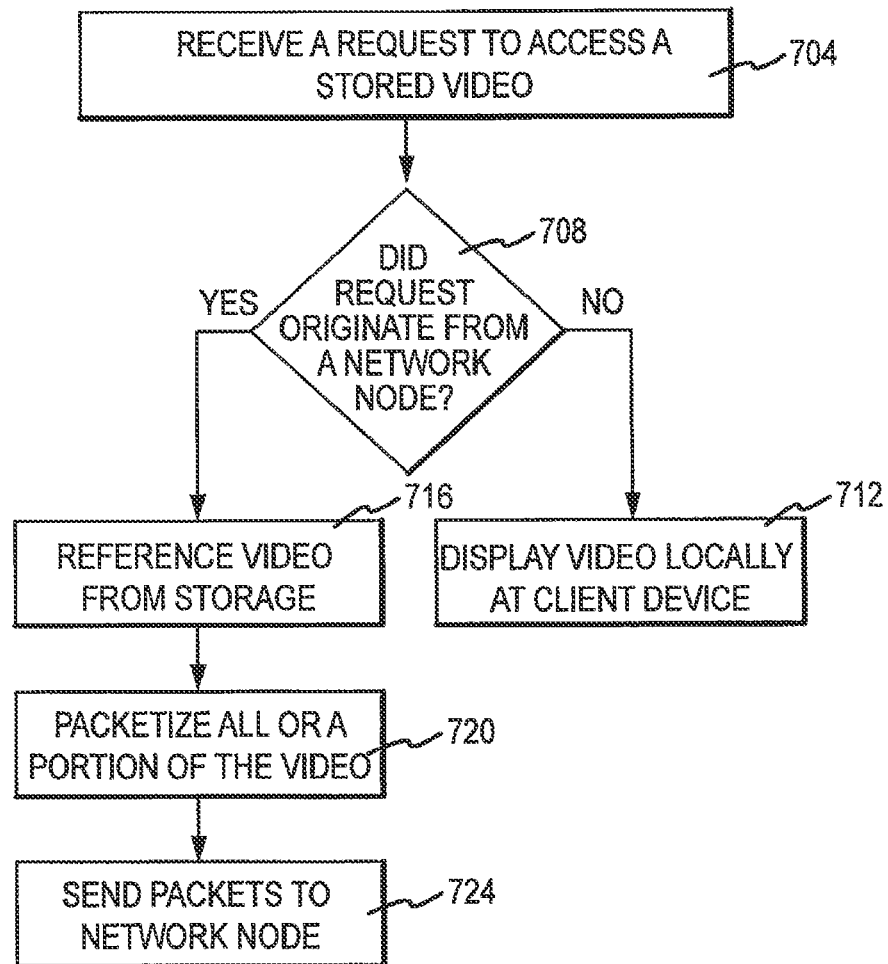


FIG. 7

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SATELLITE SIGNAL DISTRIBUTION**CROSS-REFERENCES TO RELATED APPLICATIONS**

This application is a Continuation of U.S. patent application Ser. No. 12/486,655 filed Jun. 17, 2009, entitled "Satellite Signal Distribution," the entire disclosure of which is hereby incorporated by reference, for all purposes, as if fully set forth herein.

TECHNICAL FIELD

Implementations discussed herein are directed to systems and methods for distributing satellite signals from a satellite antenna to one or more set-top boxes or other client devices.

BACKGROUND

Satellite television reception is typically accomplished with a system that includes both indoor and outdoor components. Satellite signals typically do not penetrate into indoor locations. Accordingly, a satellite reception system typically includes a satellite antenna placed or installed outdoors. The satellite antenna may be in communication with a set-top box or other client device that is located near a television or monitor. The set-top box will typically include a tuner and other electronic components that are operable to process satellite signals into a format suitable for display on the monitor.

A particular satellite antenna may be associated with a number of set-top boxes or client devices. Typically, the satellite antenna will provide each set-top box with a block of signals on a number of frequencies. The set-top box will then process the block of frequencies to extract a particular channel for display on a TV or monitor. In this arrangement, a dedicated line is provided from the satellite antenna to each set-top box. Typically, a coaxial cable provides the connection between the satellite antenna and the set-top box. Each set-top box generally requires a dedicated coaxial cable that is connected to the satellite antenna and that carries a full block of satellite signals. Thus, if a residence or other building houses multiple set-top boxes, each may require a separate connector run to the antenna.

SUMMARY

Implementations discussed herein are directed to a system and method for receiving satellite television signals. A centralized system component may be provided in association with the satellite antenna. The centralized system component includes at least one or more tuners and one or more demodulators. For each tuner and demodulator, the centralized system component may be operable to support a connection to a set-top box or other client device. The centralized component may also include one or more demultiplexers for each tuner and demodulator. The centralized component may provide output through a network adapted that provides output through a single output, which may be a coaxial cable in one embodiment. The centralized component may send output in the form of packetized data directed to one or more set-top boxes by way of a network transaction. The set-top box or boxes may be operable to receive the network transaction and to process the data, as appropriate, for display on a TV/monitor. In response to user input, the set-to box may also be operable to send network transactions to the centralized component requesting a channel change. Videos, including high

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definition video, may be stored at a particular set-top box and shared among set-top boxes or other network nodes by means of one or more network transactions.

One embodiment is directed to a satellite signal receiving system component, which includes: one or more tuners operable to receive one or input signals, each input signal including a block of intermediate frequency signals, the intermediate frequency signals having been down converted from a satellite downlink signal, each tuner operable to select and output a transponder signal from the intermediate frequency signal; one or more demodulators, each demodulator having an input connected to an output of one of the tuners, each demodulator operable remove a carrier signal from the transponder signal received from the tuner and operable to output a baseband signal; and a network adapter operable to receive one or more baseband signals and to packetize data associated with the baseband to form one or more packets, the network adapter operable to transmit the packets across a network through a single output.

One embodiment is directed to a client device In a satellite receiving system, the client device comprising: a network adapter operable to receive a number of packets, the packets comprising a packetized stream of data received from a satellite; a decoder connected to the network adapter, the decoder operable to decode an audio, a video and/or a data stream associated with the packetized stream of data; and audio visual processing unit connected to the decoder operable to convert digital data to one or more analog signals and to output the analog signals.

One embodiment is directed to a method of receiving satellite television signals, comprising: receiving a block of intermediate frequency signals, the intermediate frequency signals having been down converted from a satellite downlink signal; in response to receiving the block of intermediate frequency signals, filtering the block of intermediate frequency signals by a tuner to remove a transponder signal; in response to filtering the block of intermediate frequency signals, demodulating the transponder signal by a demodulator to produce a baseband signal; packetizing data from the baseband signal at a network adapter to produce a packetized data; and transmitting the packetized data set from the network adapter across a network to be received by a client device.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is block diagram showing components of a satellite television receiving system;

FIG. 2 is block diagram showing components of a satellite television receiving system having a tuner and demodulator;

FIG. 3 is a block diagram showing components of a satellite television receiving system having a tuner, demodulator and demultiplexer section;

FIG. 4 is block diagram of a home networking environment including the satellite television receiving system of FIG. 2;

FIG. 5 is a flow chart showing operations in a method of receiving satellite television service;

FIG. 6 is a flow chart showing operations in another method of receiving satellite television service; and

FIG. 7 is a flow chart showing operation in a method of sharing videos in a satellite system.

DETAILED DESCRIPTION

Implementations discussed herein are directed to systems and methods for integrating satellite television reception with a local area network (LAN). Satellite television may be received through set-top box or other client device. As used

herein, a “set-top box”, “television receiver,” or “client device” are used interchangeably to refer to device that is located on or near a TV or monitor and processes signals received from a satellite antenna or system component associated with a satellite antenna to produce signals in a format for display on the TV/monitor. In addition to a set-top box, the LAN may be used to interconnect a number of network nodes including, for example, gaming consoles, multimedia centers, and/or general purpose computers. The LAN may be implemented using a standard that includes coaxial cable as a physical media or interconnection means. Implementations discussed herein operate to allow signals received over a satellite link to be transmitted across the coaxial cables of the LAN. Audio, visual and/or data streams received from satellite link may be transmitted through the coaxial cables by means of the LAN protocol such that the satellite streams do not interfere with other communications that may occur between network nodes.

FIG. 1 is a schematic that shows components and features of implementations discussed herein. The various components shown in FIG. 1 correspond to various stages associated with a satellite television transmission. Implementations discussed herein may utilize a direct broadcast satellite (DBS) system which can incorporate packetized transmission signals according to an appropriate standard, such as the MPEG-2 standard. Encrypted direct broadcast satellite DBS signals may be received as downlinked signals by a satellite antenna 112. The downlinked signals may be transmitted from a satellite 108 over an appropriate frequency band such as, for example, the C-band, the K_u -band or the K_a -band. The satellite antenna 112 may include a parabolic dish which can be approximately eighteen inches to one meter in diameter in one embodiment. Front end processing of the satellite signal may be accomplished by a low noise block down converter feed 116 (LNBF) provided at the antenna focal point. This may include a converter module with a low noise amplifier that receives the signals from the antenna 112 and a block down converter that converts the entire frequency band of satellite signals to a lower, intermediate frequency range. Typically, the LNBF 116 will convert the satellite signals to signals that are within the L-band frequency range (e.g., about 390 MHz to about 1.55 GHz) to a lower frequency.

The downconverted, L-band signals may be received by a tuner 120, which selects a specific frequency range. The L-band signals received by the tuner 120 may include a number of transponder signals received from one or more satellites 108. A particular transponder signal may include a combination or multiplex of a number of transport streams associated with one or more channels. A particular transport stream may include, for example, compressed audio or visual data. By applying band-pass filtering techniques, the tuner 120 may select a particular transponder signal from the group of signals received from the LNBF 116.

The transponder signal selected by the tuner 120 may then be demodulated by the demodulator 124. Signals associated with the various stages preceding the demodulator 124 include a combination of an information carrying signal and a sinusoidal carrier signal. Prior to transmission from the uplink center 104, the information carrying signal modulates a sinusoidal carrier signal to form the uplink signal that is transmitted to the satellite 108. The L-band signal received by the demodulator 124 represents a frequency translated version of the original uplink signal. The demodulator 124 performs an operation that is substantially an inverse of the modulation operation that occurred at the uplink center 104.

Specifically, the demodulator 124 removes the sinusoidal carrier signal and outputs the information carrying signal as a baseband signal.

In addition, the demodulator 124 or other module may perform an error correction and packet synchronization functions. In error correction and packet synchronization, the demodulator 124 or other module may combine a QPSK decoder and a Reed-Solomon and Viterbi forward error corrector. The QPSK decoder may accept the digital signals and convert them to data and checksum bits corresponding to packets in the data stream. Forward error correction logic may accept the data and checksum bits and correct errors that occurred in the transmission of data stream. Following error correction and packet synchronization, the demodulator 124 or other module may output one or more compliant transport streams, for example in MPEG-2 format as defined by the ISO 13818 MPEG specification.

Output from the demodulator 124 may be directed to a demultiplexer 128. The demultiplexer 128 may be an integrated circuit that accepts the packetized, time domain multiplexed data stream of the MPEG-2 transport stream and routes the packets to various components for further processing. In so doing, the demultiplexer 128 may separate out various transport streams that are contained in a particular transponder signal. In addition to routing packets of data, the demultiplexer 128 may also unscramble encrypted data, provide buffering of the MPEG data, and/or maintain program clock reference handling to keep the local clock synchronized with the clock at the uplink center 104.

Output from the demultiplexer 128 may be directed to a decoder 132, which may process the various transport streams that are output from the demultiplexer 128. The decoder 132 may include an audio decompressor portion that is operable to decompress an audio stream, and a video decompressor portion that is operable to decompress a video stream. The audio stream and video stream may be fully compliant audio and video program elementary streams as defined by, for example, ISO 13818-2 and ISO 13818-3 of the MPEG-2 standard, respectively. Output from the decoder 132 may be directed to an audio visual (A/V) processing module 136. The A/V processing module 136 may process the video and audio streams using digital-to-analog conversion techniques to produce one or more output signals. The resulting baseband analog signals may then be sent to a TV/monitor 140 through appropriate connections.

Implementations discussed herein may locate at least the tuner 120 and demodulator 124 portions proximate to the satellite antenna 112 and LNBF 116. In some embodiments, the demultiplexer 128 may be located, along with the tuner 120 and decoder 124, proximate to the satellite antenna 112 and LNBF 116. Conventionally, these components are integrated into a set-top box or receiver that is located proximate to the TV/monitor 140. With the tuner 120 and all components downstream from the tuner 120 located in a set-top box, a dedicated signal path exists between the LNBF 116 and each set-top box. In this configuration, each dedicated signal path transmits an L-band signal having all transponder signals received by the satellite antenna 112. Each such signal path typically includes a coaxial cable that extends between the satellite dish 112, which is deployed at an outdoor location, and the set-top box, which located indoors. In this arrangement, the coaxial cable that delivers signals to the set-top box cannot be shared or otherwise form a portion of a network. This is due to the fact that the L-band signals carried by cable would interfere with other signals sent across the cable.

In contrast to the aforementioned arrangement, implementations discussed herein are operable to deliver audio, visual

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and/or data content received from the satellite antenna **112** to a set-top box over a shared network cable. In so doing, signal processing of L-band signals may be centralized in a system component that is disposed proximate to the satellite antenna **112**. Following signal processing of the L-band signals, the associated audio, video and/or data content may be sent to the set-top box by means of a local area network (LAN) transaction. A set-top box adapted to receive audio, video and/or data content in this manner may be include a network adapter that allows the set-box to send and/or receive data across a LAN. Physically, the LAN may be implemented using coaxial cables and coaxial cable splitters arranged to interconnect various network nodes including one or more set-top boxes.

FIG. 2 is block diagram showing components and features of a system in accordance with implementations discussed herein. The system shown in FIG. 2 includes a tuner and demodulator **204** associated with an LNBF **116**. The tuner and demodulator **204** receives a plurality of inputs from the LNBF **116**. Each input to the tuner and demodulator **204** carries an L-band signal having all transponder signals received by the satellite antenna **112**. Due to the inability of downlinked satellite signals to be received indoors, the LNBF **116** and the associated satellite antenna **112** may be disposed at an outdoor location. While the tuner and demodulator **204** is located proximate to the LNBF **116**, the tuner and demodulator **204** may be either indoors or outdoors.

By way of example and not limitation, the tuner and demodulator **204** shown in FIG. 2 accepts four L-band inputs from the LNBF **116**. For each input, the tuner and demodulator **204** includes a separate tuner **120** and demodulator **124** component. Together, a tuner **120** and demodulator **124** may be operable to select a particular satellite transponder signal and remove the carrier signal from the transponder signal. The resulting baseband signal may be provided to a network adaptor **208** portion of the tuner and demodulator **204**. The network adaptor **208** may be operable to packetize data associated with the baseband signal in a predetermined format, allowing the data to be sent in a network transaction. The tuner and demodulator **204** may also may include a single output connected to the network adaptor **208**. The single output may include a coaxial cable that provides a communication path to one or more set-top boxes **220**. For each tuner and demodulator, the tuner and demodulator section **204** may be operable to support a connection to a set-top box or other client device **140**. If the tuner and demodulator communicates with a plurality of set-top boxes **220** the single coaxial cable may be provided to one or more splitters **212** that create a signal pathway to a number of set-top boxes **220**.

Providing a single output from the tuner and demodulator **204** may simplify the cabling needed to distribute satellite signals in a home or other location. Specifically, only one cable is needed to extend from the satellite antenna **112**. This is in contrast to traditional configurations that include a dedicated cable from the satellite antenna **112** for each set-top box in the home. Accordingly, coaxial cable lines that are typically installed in a home may be used to carrier output from the tuner and demodulator **204**. Additionally, as the tuner and demodulator **204** communicate with a set-top box **220** by means of an network transaction, the coaxial cable used to distribute the satellite signals may form part of a network through which other network nodes may communicate.

Generally, the network adapter **208** is operable to run a suitable network protocol stack, such as TCP/IP, to thereby send and receive packets from a network node, such as the set-top box **220**. Like the tuner and demodulator **204**, the set-top box includes a network adapter **216** operable to run a TCP/IP protocol stack. In one embodiment, the media access

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layer of the protocol suite run by the network adapters is implemented as the Multimedia over Coax Alliance (MoCA) standard. The MoCA is a networking protocol that may facilitate home networking on existing coaxial cable in the 1 GHz microwave band using orthogonal frequency-division multiplexing OFDM modulation. Through a MoCA network high-quality multimedia content and high-speed data may distributed with throughput exceeding 100 Mbit/s. As of this writing, recent versions of the MoCA standard may achieve 400 Mbit/s of raw bandwidth, corresponding to 250-300 Mbit/s of transport data. In accordance with certain implementation, multiple networks may be run on the same cable, leading to at least 800 Mbit/s of raw bandwidth. In this implementation, a cable may carry ten or more 50 Mbit/s transport multiplexes or 10s of individual high definition (HD) channels.

The network adapter associated with a set-top box **220** may be operable to receive packetized data from the tuner and demodulator **204**. In the embodiment shown in FIG. 2, the data received from the tuner and demodulator **204** may correspond to a full transponder multiplex. The set-top box **220** may be further operable to processes the transponder multiplex into a format suitable for output to the TV/monitor **140**. Specifically, the set-top box **220** may include a demultiplexer **128** operable to separate out individual transport streams, a decoder **132** operable to decompress individual transport streams and an A/V processing unit **136** operable to convert digital data into an analog format. The set-top box **220** may provide analog signal output to the TV/monitor **140**, formatted for display as appropriate.

The system illustrated in FIG. 2 may packetize and send full transponder multiplexes across a LAN. In accordance with certain embodiments, individual transport streams may be separated out from the full transponder multiplex prior to transmission across the LAN. FIG. 3 is block diagram showing components and features of a system in accordance with embodiments discussed herein. The embodiment shown in FIG. 3 includes a tuner, demodulator and demux section **304** provided in association with an LNBF **116**. The tuner, demodulator and demux section **304** receives a plurality of inputs from the LNBF **116**. Each input to the tuner, demodulator and demux section **304** carries an L-band signal having all transponder signals received by the satellite antenna **112**. Due to the inability of downlinked satellite signals to be received indoors, the LNBF **116** and the associated satellite antenna may be disposed at an outdoor location. While the tuner, demodulator and demux section **304** is located proximate to the LNBF **116**, the tuner, demodulator and demux section **304** may be either indoors or outdoors.

By way of example and not limitation, the tuner, demodulator and demux section **304** shown in FIG. 3 accepts four L-band inputs from the LNBF **116**. For each input, the tuner, demodulator and demux section **304** includes a separate tuner **120**, demodulator **124** and demultiplexer **128** component. Together, a tuner **120** and demodulator **124** may be operable to select a particular satellite transponder signal and remove the carrier signal from the transponder signal. Following these operations, a demultiplexer **128** may separate out individual transport streams. The resulting baseband signals that have been separated into individual transport streams may be provided to a network adaptor **208** portion of the tuner, demodulator and demux section **304**. The network adaptor **208** may be operable to packetize data associated with the baseband signal in a predetermined format, allowing the data to be sent in a network transaction. The tuner, demodulator and demux section **304** may also may include a single output connected to the network adaptor **208**. The single output may

include a coaxial cable that provides a communication path to one or more set-top boxes **140**. If the tuner, demodulator and demux section **304** communicates with a plurality of set-top boxes **140** the single coaxial cable may be provided to one or more splitters **212** that create a signal pathway to a number of set-top boxes **140**.

Generally, the network adapter **208** is operable to transmit and receive data packetized in accordance with a suitable network protocol stack, such as IP/TCP. Thus, the adapter may send and receive packets from a network node, such as a set-top box **140**. Like the tuner, demodulator and demux section **304**, the set-top box **140** includes a network adapter **216** operable to run a IP/TCP protocol stack. In one embodiment, the media access layer of the protocol suite run by the network adapters is implemented as the Multimedia over Coax Alliance (MoCA) standard. The network adapter associated with a set-top **140** is operable to receive packetized data from the tuner, demodulator and demux section **308**. In the embodiment shown in FIG. 3, the data received from the tuner, demodulator and demux section **304** may include one or more individual transport streams. The set-top box **320** may be further operable to processes the transport streams into a format suitable for output to the TV/monitor. Specifically, the set-top box **320** may include a decoder **132** operable to decompress individual transport streams and an A/V processing unit **136** operable to convert digital data into an analog format. The set-top box **140** may provide analog signal output to the TV/monitor **140**, formatted for display as appropriate.

Implementations discussed herein provide a means for allowing a set-top box to connect to a network by means of the same cable in which the set-top box receives signals and/or data from a satellite. This concept is further illustrated in FIG. 4. FIG. 4 is a schematic illustration of a home or other client location that includes a number of set-top boxes **220** operable to receive satellite television service. The home network **400** includes a single antenna by way of example and not limitation. The antenna is connected to a tuner and demodulator **204**. The tuner and demodulator **204** includes an output that connects to a number of set-top boxes **220** through a number of splitters **212**.

A set-top box **220** may include a network adapter operable to send and receive data to and from the tuner and demodulator **204**. By way example and not limitation, the home network shown in FIG. 4, is implemented with the network structure of FIG. 2. Specifically, separate transponder streams are separated out from a full transponder multiplex at the set-top **220**. Accordingly, the set-top box **220** shown in FIG. 4 includes a demultiplexer **128**. In alternative implementations the demultiplexer **128** may be disposed at a central location as shown in FIG. 3. The set-top box **220** shown in FIG. 4 additionally includes a decoder **132** and an A/V processing unit **136**, downstream from the demultiplexer **128**. Output from the A/V processing unit **136** is provided to a TV/monitor **140**.

The set-top box **220** may additionally include a processor **404** operable to run executable code in connection with various functions associated with the set-top box **220**. For example, the processor **404** may display graphics, images, animations or other content on the TV/monitor **140**. The processor **140** may be operable to receive command or other information relating to changes to the account status, and may be operable to initiate or facilitate transmission of one or more messages to the service provider. In order to facilitate communication with a service provider the set-top box **220** may be connected to the Internet **416**. Specifically, the networking environment in which the set-top **220** operates may include a

router **420** that is operable to direct IP packets across the Internet **416**. The router **420** may be connected to the home network **400** through a network adapter **424** that provides output over coaxial cable in one embodiment. Communications to and from the set-top box **220** that occur across the Internet **416** may reach the set-top box **220** through a path that includes one or more splitters **212**. Here, it is noted that the set-top box **220** includes a single cable at its input. This single cable may be used to carry communications to and from the satellite antenna **112** and across the Internet **416**.

The processor **404** may perform such tasks as executing commands received from a user. User commands may be sent to the set-top through a user input device such as remote or other wireless device. One such command may be, for example, a command to change the channel that is currently displayed on the T/V monitor **140**. In processing such a command, the processor **404** may receive input from a user input device and format the command in a format to be sent to the tuner and demodulator **204**. Specifically, the processor **404** may packetize the channel change command and pass the packetized command to the network adapter **216**. From the network adapter **216**, the channel change command may be sent across the home network **400** that may be implemented using coaxial cables in one embodiment. The channel change command may be received by the tuner and demodulator **204** through its network adaptor **208**. The channel change command may be processed at the tuner and demodulator **204**. Specifically, the appropriate tuner **120** will be adjusted to receive the particular satellite transponder that contains the channel specified by the channel change command that was input by the user.

The processor **404** may be further operable to recall and display stored content, such as a purchased or recorded videos or programs. The set-top box **220** may include or be associated with a recorder **408**, such has a Digital Video Recorder (DVR). The recorder **408** may be integrated into the set-top box **220**, or it may be a stand alone device. The recorder **408** may be operated by a user who programs the device or set-top box function to record a particular program at a specified time. When the program occurs, the recorder **408** will record and store the program, which can then be viewed by a user at a convenient time. In addition to this functionality, the recorder **408** may buffer a certain amount of content during a live transmission. Buffering a live transmission allows a user to pause and/or rewind the content of the transmission and to then display the content in a non-live or delayed manner.

The set-top box **220** may include or be associated with a memory or other storage device **412**, such as magnetic or optical storage. The storage device **412** may be operable to store data received from the decoded satellite signal. The storage device **412** may be volatile or non-volatile memory implemented using any suitable technique or technology such as, for example, random access memory (RAM), disk storage, flash memory, solid state and so on. The storage device **412** may be located within the set-top box **220** or separately from the set-top box **220**. The storage device **412** may removable in nature. The stored data set may include audio and/or visual content to be transmitted and displayed through the display. Generally, audio/visual content may include still images, video images, animation and/or audio. Portable Network Graphics (PNG) or other appropriate formats, such as for example, Tagged Image File Format (TIFF), Joint Photographic Experts Group (JPEG), Motion Picture Experts Group (MPEG)-2, MPEG-4 may be used to display an image or video. As a result commands or setting from a user, videos or other program may be stored locally in storage **412**. Stored

program may include for example recorded broadcasts, pay-per-view items and/or buffered portions of a live video broadcast.

The set-top box 220 may be used to implement a system that is operable to share movies and/or other recording, including high-definition movies. Specifically, the set-top box 220 may store a particular video in storage and this video may be accessed by other network nodes, such as other set-top boxes 220. The video stored in storage 412 may include recordings that are recorded and stored by the recorder 408. The video stored in storage 412 may also be pay-per-view item or on-demand item that is rented or purchased. In one embodiment, the video stored in storage 412 may be high definition movie or video. In sharing the video stored in storage 412, the set-top box 220 may retrieve the video from storage 412 and packetize the video for transmission through the network adapter 216. The video may be sent in response to a command other request sent to the set-top box 220 from a particular network node. In one embodiment, the request for the video may originate from another set-top box 220 that is located in the home. In this instance, a video including a high definition video that is stored in one set-top box 220 may be shown on a display 140 that is associated with a second set-top box 220.

In accordance with other embodiments, a request for the stored video may be received from across the Internet 416. Specifically, as the set-top box 220 includes a network adapter that is operable to send and receive packets across the Internet 416, videos that are stored in storage may be accessed from locations that are remote from the home. In particular, the set-top box 220 may packetize the videos in an appropriate format to form a video stream that is sent through the router 420 and across the Internet 416. For example, a user may record a particular television program through the operation of the recorder 408. The user may then access the television program through his or her workplace computer, which located at a remote location.

Further, it should be noted that individual set-top boxes 220 may communicate with one another via the existing cabling. For example, one set-top box located in a first room may communicate with, and thus share data with, a second set-top box located in another room. If both set-top boxes are connected to the same splitter then they may route signals and/or data to and from one another through the splitter. Otherwise and in an embodiment employing multiple splitters, communications may be routed through the tuner/demodulator/demux section 204.

The foregoing may permit a user to retrieve and view a program stored on a set-top box that is located in a room other than the one he occupies and on a display device not directly connected to the set-top box storing the program. For example, presume a user is in a first room that contains a first display device and a first set-top box. The user may instruct the first set-top box to retrieve data (such as a program) from a second set-top box located in a different room. The first set-top box may employ the communications network disclosed herein to send a command to the second set-top box. In response to the command, the second set-top box may transmit data across the communications network to the first set-top box, which in turn may display the program on the display device. In certain embodiments, the various set-top boxes may act as a distributed storage system in a manner transparent to the user. That is, the user may not know which set-top box stores any particular data and the system may simply show the user a list of all data stored on all set-top boxes. Thus, the experience of retrieving and watching data is both

seamless and constant, no matter which set-top box the user employs to access the distributed storage system.

In such an embodiment, the various set-top boxes 220 may cooperate to store data (such as audiovisual programs) in various locations. For example, a first set-top box may have a timer set to record a program but not have sufficient disk space to actually do so. The first set-top box may instruct a second set-top box to initiate recording of the program, potentially after verifying that the second set-top box has sufficient storage space to store the entire program. As yet another option, the first set-top box may record a portion of the program then instruct the second set-top box to record the remainder of the program. When a user initiates playback of the stored program from any set-top box in the communications network, the appropriate portions of the program may be retrieved in order and displayed to the user as generally described above.

FIG. 5 is flow chart showing operation in a method in accordance with implementations discussed herein. FIG. 5 illustrates a method for receiving satellite television signals and may be understood with reference to the system shown in FIG. 2. Initially at operation 504, a block of signals at an intermediate frequency range is received. The block of signals may be received from satellite antenna 112, which converts a downlinked satellite signal to the signals carried on the intermediate frequencies. The block of signals may be received a centralized system component, such as the tuner and demodulator 204, which may be located proximate to the satellite antenna 112. Following operation 504, operation 508 may be executed.

At operation 508, the block of frequencies may be initially processed by a tuner 120 component of the tuner and demodulator 204. The tuner 120 may process the block of signals to extract a particular transponder signal that is directed to the demodulator 124 for processing at operation 512. At operation 512, the demodulator 124 removes a carrier signal from the extracted transponder signal to produce a baseband signal that is directed to the network adaptor 208 for further processing at operation 516. At operation 516, data associated with the baseband signal is packetized and sent to a client device 220 by means of a network transaction. The data sent at operation 516 may represent a full transponder multiplex.

Following operation 516, operation 520 may be executed. At operation 520, data is received at a client device 220 through the network transaction initiated in operation 516. The data received at operation 520 may be directed to a demultiplexer 128 for further processing at operation 524. At operation 524, the demultiplexer 128 may separate out individual transport streams that are combined in the full transponder multiplex received at the client device 220. The individual transport streams may be directed to a decoder 132 for further processing at operation 528. At operation 528, the individual transport streams may be decompressed and sent to an A/V processing unit 136 for further processing at operation 532. At operation 532, the decompressed data streams may be converted from digital to analog and the analog signal sent as output from the client device 220 to be received by a TV/monitor 140.

FIG. 6 is flow chart showing operation in a method in accordance with implementations discussed herein. FIG. 6 illustrates a method for receiving satellite television signals and may be understood with reference to the system shown in FIG. 3. Initially at operation 604, a block of signals at an intermediate frequency range is received. The block of signals may be received from satellite antenna 112, which converts a downlinked satellite signal to the signals carried on the intermediate frequencies. The block of signals may be received a centralized system component, such as the tuner,

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demodulator and demux section 304, which may be located proximate to the satellite antenna 112. Following operation 604, operation 608 may be executed.

At operation 608, the block of frequencies may be initially processed by a tuner 120 component of the tuner, demodulator and demux section 304. The tuner 120 may process the block of signals to extract a particular transponder signal that is directed to the demodulator 124 for processing at operation 612. At operation 612, the demodulator 124 removes a carrier signal from the extracted transponder signal to produce a baseband signal that is directed to a demultiplexer 128 for further processing at operation 616. At operation 616, the demultiplexer 128 may separate out individual transport streams that are combined in the full transponder multiplex output from the tuner 120. The individual transport streams may be directed to the network adaptor 208 for further processing at operation 620. At operation 620, the individual transport streams may be packetized and sent to client device 320 by means of a network transaction.

Following operation 620, operation 624 may be executed. At operation 624, data is received at a client device 320 through the network transaction initiated in operation 620. The data received at operation 624 may be directed to a decoder 132 for further processing at operation 628. At operation 628, the individual transport streams may be decompressed and sent to an A/V processing unit 136 for further processing at operation 632. At operation 632, the decompressed data streams may be converted from digital to analog and the analog sent as output from the client device 320 to be received by a TV/monitor 140.

FIG. 7 is flow chart showing operation in a method in accordance with implementations discussed herein. FIG. 7 illustrates a method for sharing videos in a satellite system and may be understood with reference to the system shown in FIG. 4. Initially, at operation 704 a request for access to a stored video is received by a set-top box 220 or set-top box component. The video may be stored in the storage media 412 and may have been stored in there as a result of a number of operations or functions associated with the set-top box 220. In one instance, the video may be a recording that was obtained by the operation of the recorder 408. In another instance, the video may be a pay-per-view feature that was purchased and downloaded. Whether a recording, a pay-per-view feature or other video type, the video may have arrived at the set-top box 220 through one of the satellite signal reception paths illustrated in FIGS. 1-6. Following operation 704, operation 708 may be executed.

At operation 708, a determination is made as to whether the request for access to the video originated from a network node. Operation 712 may follow operation 708 in the case that the request did not originate from a network node. At operation 712, the video is retrieved from the storage 412 and displayed at the TV/monitor 140 associated with the set-top box 220. Operation 716 may follow operation 708 in the case that the request did originate from a network. Here, the request may have originated from a client device 220 or set-top box that is attached to the home network. In other embodiments, the request may have been received from across the Internet 416. In any event, at operation 716, the video is retrieved from the storage device 412 and sent to the network adapter 216 for further processing at operation 720. At operation 720, all or a portion of the video is packetized in an appropriate format. Operation 724 may follow operation 720. At operation 724 the packets produced in operation 720 may be sent to the network node that requested access to the stored video.

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The foregoing merely illustrates certain principles of certain implementations. Various modifications and alterations to the described embodiments will be apparent to those skilled in the art in view of the teachings herein. It will thus be appreciated that those skilled in the art will be able to devise numerous systems, arrangements and methods which, although not explicitly shown or described herein, embody the principles of the invention and are thus within the spirit and scope of the present invention. From the above description and drawings, it will be understood by those of ordinary skill in the art that the particular embodiments shown and described are for purposes of illustration only and are not intended to limit the scope of the present invention. References to details of particular embodiments are not intended to limit the scope of the invention.

What is claimed is:

1. A television distribution system, comprising:

a tuner and demodulation section, comprising a plurality of tuners and a plurality of demodulators, the tuner and demodulation section configured to:

receive a transponder signal via a tuner of the plurality of tuners, wherein the transponder signal comprises a plurality of individual transport streams, each individual transport stream of the plurality of individual transport streams comprising a television channel;

remove, by a demodulator of the plurality of demodulators, a carrier signal from the transponder signal; and transmit, to a plurality of client devices across a network, packetized data comprising the transponder signal, wherein the carrier signal has been removed from the transponder signal and the network comprises a coaxial cable network;

a first client device comprising a demultiplexer, the first client device configured to:

receive, via the network, the packetized data comprising the transponder signal;

using the demultiplexer, separate out an individual transport stream of the plurality of individual transport streams from the transponder signal, wherein the first client device is separate and remote from the tuner and demodulation section and both the client device and the tuner and demodulation section are installed at a same house as the first client device;

output the individual transport stream for display, wherein

the first client device is part of the plurality of client devices;

receive, via the network, a timer from a second client device; and

record and store video content based on the received timer to a non-transitory computer-readable storage medium; and

the second client device configured to:

transmit, via the network, a timer to the first client device;

receive, via the network, the stored video content and output for presentation the stored video content.

2. The television distribution system of claim 1, wherein the network comprises:

one or more splitters such that a single output of the tuner and demodulation section has a signal pathway to each client device of the plurality of client devices.

3. The television distribution system of claim 1, wherein the first client device is further configured to:

share the stored video content with other client devices of the plurality of client devices by packetizing and transmitting the stored video content via the network.

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4. The television distribution system of claim 1, the system further comprising:
the second client device being further configured to:
transmit, via the coaxial cable network, a command to retrieve the stored video content from the first client device. 5

5. The television distribution system of claim 4, wherein the second client device is configured to receive the stored video content, via a signal pathway created using one or more splitters, from the first client device. 10

6. The television distribution system of claim 1, wherein the second client device is further configured to:
output for presentation a listing of a plurality of stored video content, wherein
the plurality of stored video content are distributed for storage across the plurality of client devices. 15

7. The television distribution system of claim 1, wherein the first client device is further configured to:
packetize and transmit, via the coaxial cable network and the Internet, the stored video content to a remote computerized device. 20

8. A method for television signal distribution, the method comprising:
receiving, by a tuner and demodulation section, a transponder signal, wherein the transponder signal comprises a plurality of individual transport streams, each individual transport stream of the plurality of individual transport streams comprising a television channel;
removing, by the tuner and demodulation section, a carrier signal from the transponder signal; and
transmitting, to a plurality of client devices across a network, packetized data comprising the transponder signal, wherein the carrier signal has been removed from the transponder signal and the network comprises a coaxial cable network; 35

receiving, by a first client device of the plurality of client devices via the network, the packetized data comprising the transponder signal;
using a demultiplexer, separating out an individual transport stream of the plurality of individual transport streams from the transponder signal by the first client device, wherein the first client device is separate and remote from the tuner and demodulation section and both the client device and the tuner and demodulation section are installed at a same house as the first client device; 40

outputting, by the first client device, the individual transport stream for display, wherein the first client device is part of the plurality of client devices, 50

recording, by the first client device, video content to a non-transitory computer-readable storage medium; and
outputting, by a second client device of the plurality of client devices, a listing of a plurality of instances of stored video content distributed for storage across multiple client devices of the plurality of client devices. 55

9. The method for television signal distribution of claim 8, wherein the coaxial network comprises:
one or more splitters such that a single output of the tuner and demodulation section has a signal pathway to each client device of the plurality of client devices. 60

10. The method for television signal distribution of claim 8, the method further comprising:
sharing, by the first client device, the stored video content with other client devices of the plurality of client devices by packetizing and transmitting the stored video content via the coaxial cable network. 65

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11. The method for television signal distribution of claim 10, the method further comprising:
transmitting, from a second client device via the coaxial cable network, a command to retrieve the stored video content from the first client device;
receiving, by the second client device via the coaxial cable network, the stored video content; and
outputting by the second client device, for presentation the stored video content.

12. The method for television signal distribution of claim 11, the method further comprising:
transmitting, by the second client device via the coaxial cable network, a timer to the first client device; and
receiving, by the first client device via the coaxial cable network, the timer from the second client device; and
recording, by the first client device, video content based on the received timer.

13. The method for television signal distribution of claim 11, wherein the second client device is configured to receive the stored video content, via a signal pathway created using one or more splitters, from the first client device.

14. The method for television signal distribution of claim 10, the method further comprising:
transmitting, by the first client device, via the coaxial cable network and the Internet, the stored video content to a remote computerized device.

15. A system, comprising:
a tuner and demodulation section, comprising:
a plurality of tuners operative to receive a plurality of transponder streams, wherein each tuner is operable to:
select and output a first transponder signal; and
select and output a second transponder signal in response to a channel change command of a packetized request received via a network adapter from a client device of a plurality of client devices, wherein:
the channel change command is indicative of an individual transport stream that is part of the second transponder signal; and
each transponder signal comprises multiple individual transport streams and each individual transport stream comprises a television channel;
a plurality of demodulators, each demodulator having an input connected with an output of one of the plurality of tuners, and each demodulator configured to remove a carrier signal from a received transponder signal; and
the network adapter operable to:
receive the packetized request from the client device via the coaxial cable network;
provide the channel change command to a first tuner, wherein the first tuner is selected based on the channel change command received via the coaxial cable network; and
packetize the second transponder signal; and
transmit the packets comprising the second transponder signal via a coaxial network through a single output of the network adapter, wherein the apparatus comprising the plurality tuners, the plurality of demodulators, and the network adapter are installed remotely from the client device at a same household; and
the plurality of client devices, wherein the client device of the plurality of client devices is configured to:
receive timers from other client devices of the plurality of client devices;

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record and store video content based on the received
timers; and

transmit, via the coaxial cable network, instances of the
stored video content in response to requests received
from other client devices of the plurality of client
devices. 5

16. The system of claim **15**, wherein the single output line
includes a coaxial cable that forms a portion of the coaxial
cable network.

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